NEW DATA PROVE LATE APTIAN – EARLY ALBIAN AGE OF KÖSZÖRŰKŐBÁNYA CONGLOMERATE MEMBER, GERECSE MOUNTAINS, HUNGARY

by

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Abstract

The coarsening-upward clastic sequence of Gerecse Mountains had long been considered as Lower Cretaceous shallow marine deposit, but recently its deep-sea origin becomes obvious. The latest sedimentological and palaeontological studies of the uppermost, conglomeratic unit have proved sedimentation in a submarine channel of a deep-sea fan. The nannoplankton assemblage from the intercalated siltstone layers shows Late Aptian – Early Albian age. Further investigations are necessary concerning the facies and the age of all Lower and Middle Cretaceous clastic deposits in the Gerecse Mountains as well as its relationship to the Rossfeld Formation in the Northern Calcareous Alps.

Introduction

Cretaceous clastic deposits in the Gerecse Mountains have already been known for more than a hundred years (HANTKEN, 1868). Not only the ammonite-rich marl but also the sandstone and the conglomerate were regarded as shallow marine sediments of Neocomian age (HOFMANN, 1884; SOMOGYI, 1914). Detailed description of this sequence is given by FÜLÖP (1958), who considered it as a result of gradual infilling of a shallow marine bay during Berriasian – Barremian intervall.

CSÁSZÁR and HAAS (1984) referred to the turbidity origin (PETTIJOHN - POTTER, 1964) of Bersek Marl and Lábatlan Sandstone Formations, but they didn't deal with Köszörűkőbánya Conglomerate Member. KÁZMÉR (1987) explained the genesis of the conglomerate by submarine mass-gravity transport (READING, 1978).

During the latest sedimentological study of the Conglomerate Member (SZTANÓ, 1988) some palaeontological investigations were carried out, too.

Geological setting

After a short interruption in sedimentation, Upper Tithonian limestones were followed by the initial breccia member of the Bersek Marl. This formation is built up by alternations of thick marl and thin sandstone layers. Large abrasional surfaces also occur. Upward turbiditic sandstone strata become abundant (Lábatlan Sandstone Formation), occasionaly with graded bedding, sole-marks, trace fossils and slump structures. These layers are rich in nektonic and planktonic fossils. Unfortunately the transition between Lábatlan Sandstone and the Köszörűkőbánya Conglomerate Member cannot be seen now. According to FÜLÖP (1958) the uppermost part of the Bersek hill section was a conglomerate layer which might have correlated with Köszörűkőbánya Member.

Different types of sandstones and conglomerates [suggesting resedimentation in fan environment (DAVIES - WALKER, 1974)] were described from some boreholes of Western Gerecse, named Neszmély Formation (CSÁSZÁR, personal communication). In addition in the foreground area a few outcrops counted to Lábatlan Sandstone show similar lithological and sedimentological features. Our knowledge about the age and the palaeogeographical connections of these clastics of Gerecse Mts is insufficient now.

More than a century ago HANTKEN (1868) pointed to the resemblance between Rossfeld Beds and these clastics of Gerecse Lower Cretaceous. In the Alp-Carpathian region there are other analogous development in the Ivanscica Mts. of the Dinarides. Both the Rossfeld Beds and the turbidites of Ivanscica Mts. bear high amount of ophiolithic detritus, with the dominance of chrome spinel in the heavy mineral spectra (DECKER et al., 1987). Unfortunately in the heavy mineral spectrum of Köszörűkőbánya Conglomerate we weren't able to identify chomre spinels. So thorough investigations are badly needed to prove the direct palaeogeographical connections between these deposits.

General sedimentary character of Köszörűkőbánya Conglomerate

Poorly stratified conglomerates alternate with greenish-grey sandstone and grey laminated siltstones in the unique outcrop of this conglomeratic unit *(fig. 1)*.

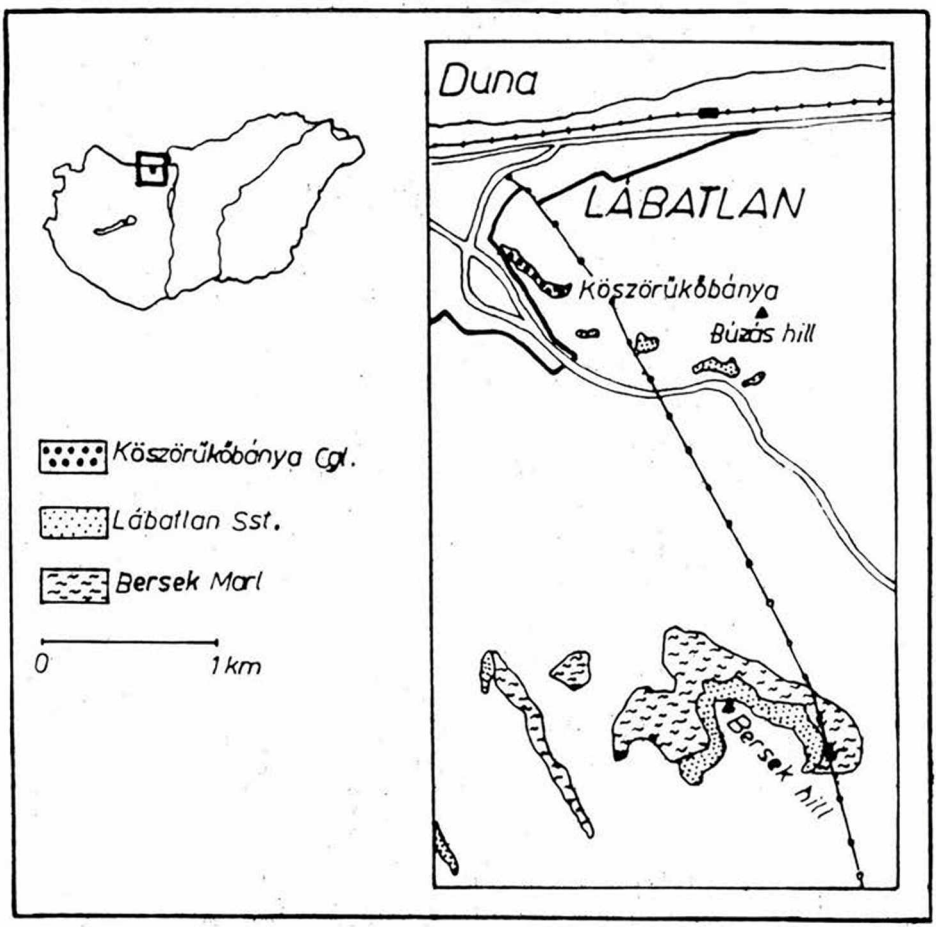


Fig. 1. Some outcrops of Lower and Middle Cretaceous formations in the northeastern foreground of Gerecse Mountains

The stratified, medium-to-coarse grained sandstone is pebbly, sometimes massive (HEIN, 1982). Occurrences of solitary cross-bedding of planar or trough type refer to traction currents. Thin strata of matrix supported, inversely graded conglomerates are also intercalated.

The clast supported, imbricated and graded conglomerate of channel-fill origin (WALKER, 1975 a, b) was incised into the underlying siltstone, producing scour marks. In this cherty conglomerate limestone boulders are abundant as well as large, up to 2 m long, intraformational rip-up-clasts of underlying sandstone and siltstone. Slump structures (KOSTER – STEEL, 1984) referring to unstable palaeoslope environment also occur. The angle of a/p/a/i/ type imbrication (WALKER, 1975 a, b) indicate palaeocurrent direction from NE to SW. Taking the palaeomagnetic data (KÁZMÉR, 1987) into consideration the palaeotransport direction must have been from SE to NW.

The sedimentological features *(fig. 2)* of this conglomeratic unit suggest deposition in a channel of a submarine fan by gravelly and sandy turbidity currents. It must have been the proximal, upper fan, while the older Lábatlan Sandstone and Bersek Marl could have deposited as a distal turbidite on the outer fan. All these indicate the progradation of this submarine fan during Lower Cretaceous.

Chronostratigraphy

From the intercalated siltstone layers six samples have been studied, but only three of them contained nannofossils.

The nannoplankton assemblage is extremly poor, only one or two specimens of the listed species have been registered except *Watznaueria* div. sp. *(fig. 3)*. Relative to frequency the number of species is large. The preservation is bad, the coccoliths are strongly etched.

The assemblage shows marine origin of normal salinity and unfavourable depositional circumstances.

The nannoplankton assemblage is rich enough for a reasonable stratigraphic evaluation. For this purpose the ranges of the identified taxa *(Table I.)* have been taken mainly from the large compilative work of PERCH-NIELSEN (1985).

In Mid Albian several common and wide-spread species appeared and all these forms are completely missing from the material of Köszörűkőbánya Conglomerate Member. Therefore it is not younger than Early Albian.

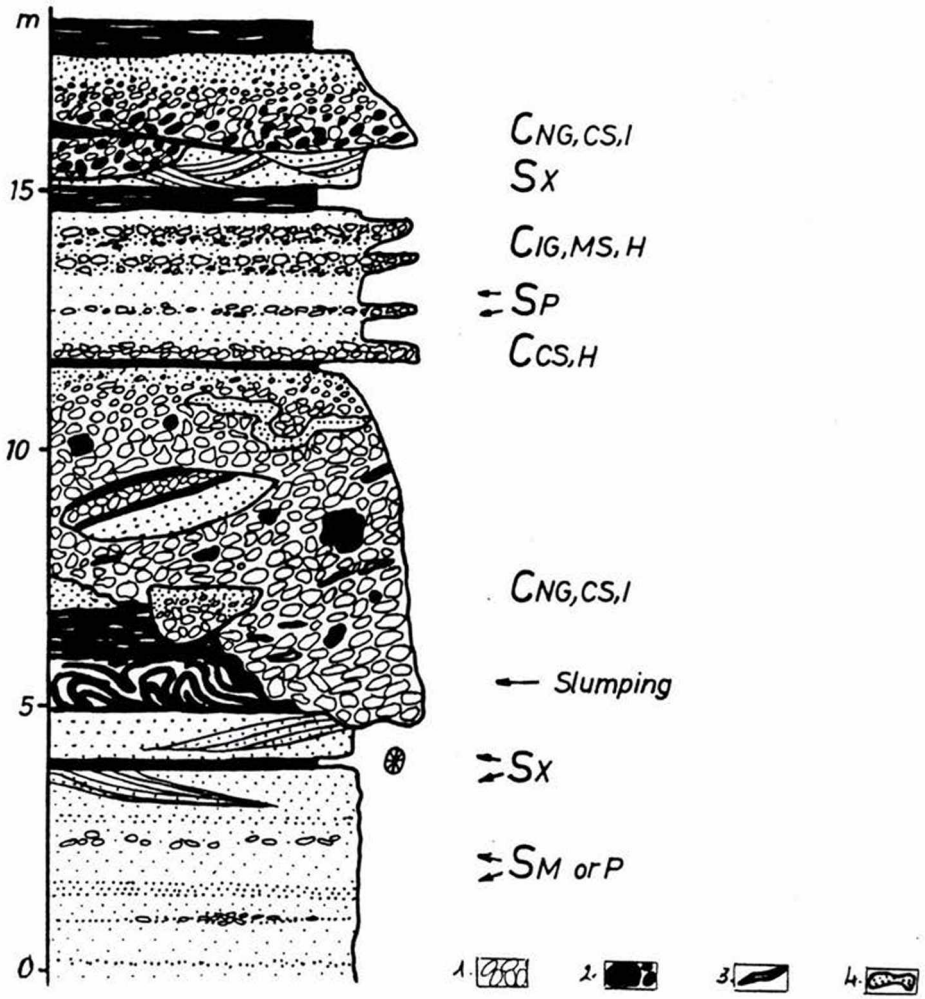


Fig. 2. Schematic section shows the most important sedimentological and lithological features of Köszörűkőbánya Member. C= conglomerate: NG= normal-, IG= inverse graded, CS= clast-, MS= matrix supported, I= imbricated, H= subhorizontal clasts; S= sandstone: P= pebbly, M= massive and, X= cross-stratified. Particles: 1= chert, 2= limestone, 3= siltstone, 4= sandstone rip-up-clasts, 5= Late Aptian – Early Albian nannoplankton assemblage.

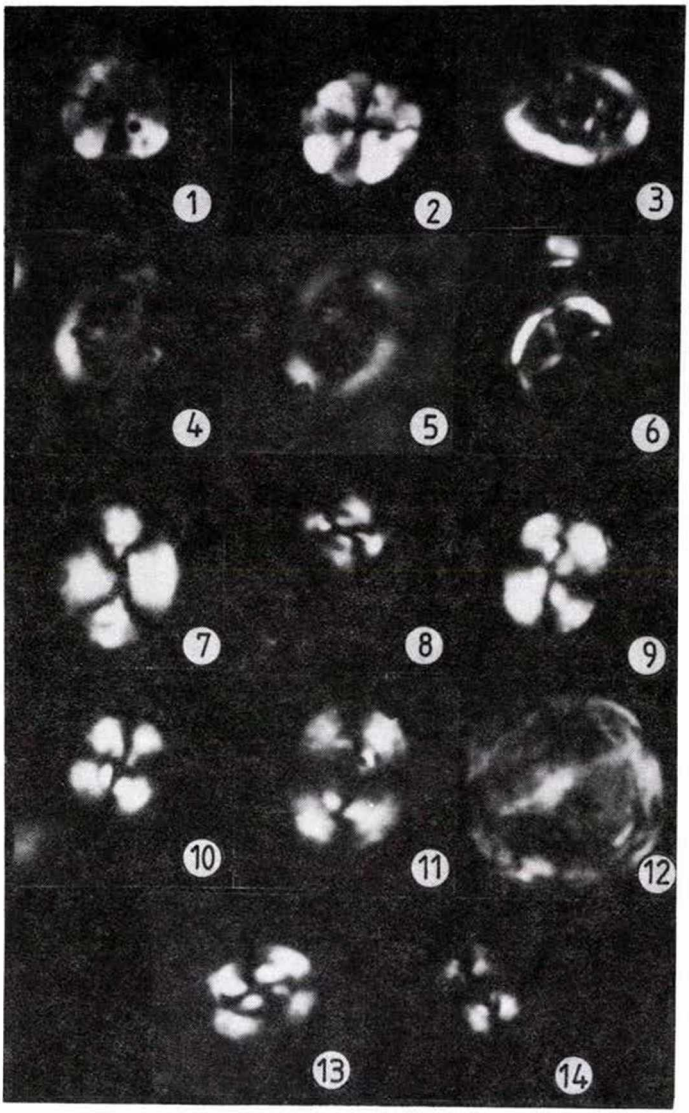
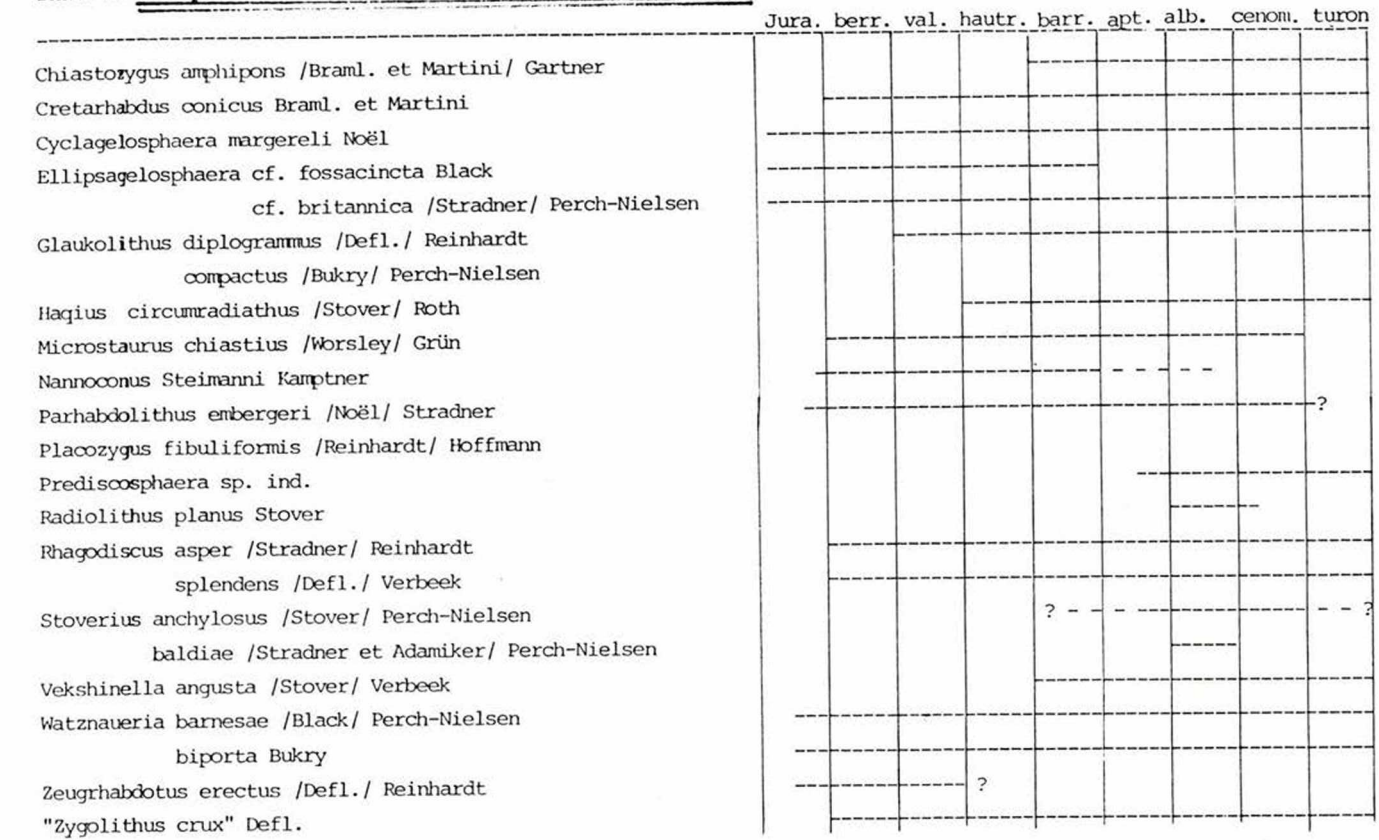


Fig. 3. Microscopic photographs of nannoplanktons from Köszörűkőbánya, magnification: 3000x (photos by M. BÁLDI-BEKE)

1. *Radiolithus planus* STOVER, +N, 2. *Radiolithus planus* STOVER, +N, the same specimen rotated by 45°, 3. *Rhagodiscus splendens* (DEFL.) +N, 4. *Cretarhabdus conicus* BRAML. et MARTINI, +N, 5. *Cretarhabdus conicus* BRAML. et MARTINI, +N, 6. *Chiastozygus amphipons* (BRAML. et MARTINI), +N, 7. *Watznaueria biporta* BUKRY, +N, 8. *Watznaueria barnesae* (BLACK), +N, 9. *Watznaueria barnesae* (BLACK), +N, 10. *Watznaueria barnesae* (BLACK), +N, 11. *Watznaueria barnesae* (BLACK), IIN, 12. Coccosphaera, probaby *Watznaueria* sp. not collapsed due to rapid burying, 13. *Watznaueria* sp., +N, 14. *Watznaueria* sp., +N.

Table I. Nannoplankton assemblage from Köszörűkőbánya, Lábatlan



After Perch-Nielsen, 1985

Among the identified taxa the youngest species having its first occurrence is *Radiolithus planus* (STOVER). It is known only from Albian age. *Eprolithus floralis* (STRADNER) the one resembling species has its first appearance in Mid Aptian and it has nine radial elements too, but it is higher in shape. The uncertain range of *Stoverious baldiae* covers Albian. The earliest known *Prediscosphaera* species is from Late Aptian, but the genus is more common and characteristic from Early Albian upwards.

These data fix the stratigraphic position of Köszörűkőbánya conglomerate as Late Aptian – Early Albian, though Early Albian age is more probable.

In addition to the nannoplankton studies, the badly preserved *Orbitolina* fauna from siltstones and calcareous sandstones of Köszörűkőbánya conglomerate refers to Late Aptian – Albian age (GÖRÖG, personal communication). The small, simple and spherical embrionic apparatus, the zigzag shaped radial zone and marginal chambers dissected by flat secondary septa are characteristic of Middle Cretaceous forms, too. Smaller foraminifer had not been found yet.

Summary

It have been proved that Köszörűkőbánya Conglomerate Member, earlier believed Barremian, deposited during Late Aptian – Early Albian intervall, so a hiatus appeared on the stratigraphic column of Lower – Middle Cretaceous units of Gerecse Mountains *(fig. 4)*. Today we know little about sedimentation and deposits of this intervall. Perhaps Neszmély Formation might have filled up this gap, but further investigations are necessary.

Acknowledgements

We thank DR. CSÁSZÁR for drawing our attention to deposits of Köszörűkőbánya and for helpful discussions.

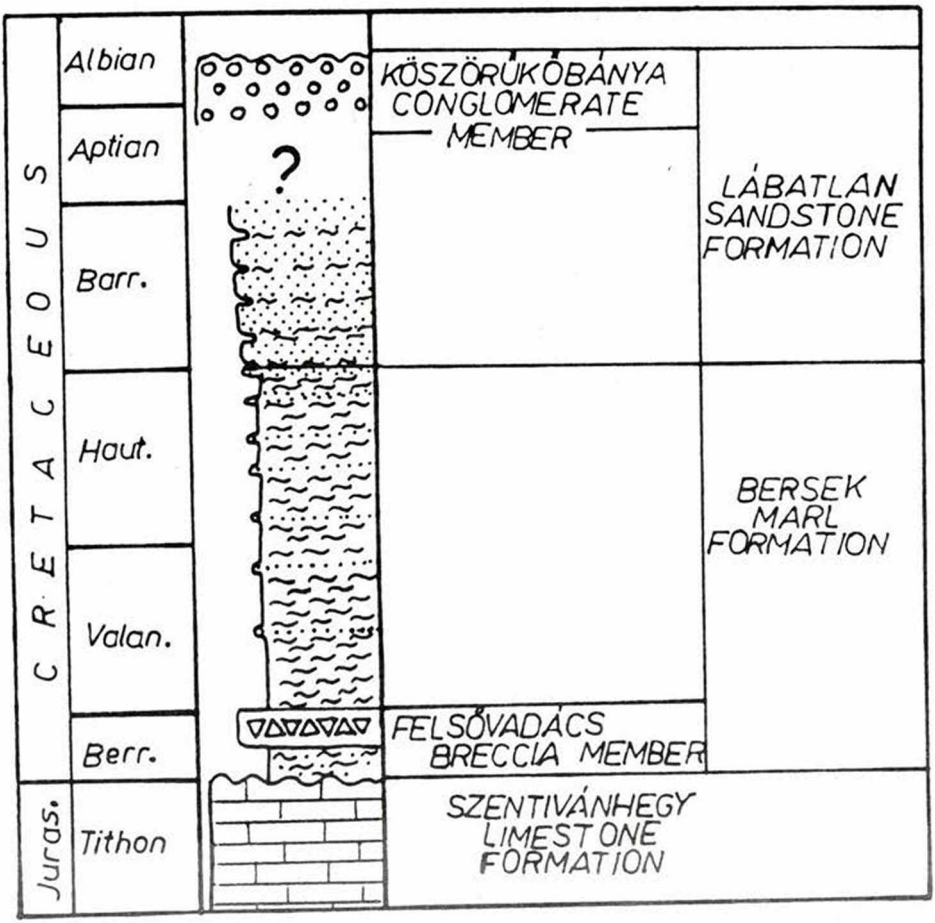


Fig. 4. Stratigraphy of Lower and Middle Cretaceous formations in Gerecse Mountains

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